WE CLAIM:

1.   A method of allocating queues in a network device, the method comprising:

5   making a classification for an incoming packet;
         determining whether a queue has already been allocated for the classification; and
         allocating the queue when the queue has not already been allocated for the classification.

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2.   The method of claim 1, wherein the queue is associated with an ingress port of the network device.

3.   The method of claim 1, wherein the queue is a
15 virtual output queue.

4.   The method of claim 1, further comprising:
         detecting when a queue is empty; and
         de-allocating the empty queue.

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5.   The method of claim 1, wherein the queue is associated with an ingress port.

6.   The method of claim 1, wherein the classification is
25 based on a packet source, a packet destination or a packet priority.

7.   The method of claim 1, wherein the classification comprises a Q number.

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8.   The method of claim 1, wherein the determining step comprises addressing a memory that indicates whether the classification has already been allocated a queue.

9.   The method of claim 4, further comprising updating a
memory when a queue is de-allocated, wherein the memory
indicates whether the classification has already been
allocated a queue.

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10.   The method of claim 4, wherein the network device
further comprises a free list that indicates queues
available for allocation and wherein the method further
comprises updating the free list when a queue is de-

10   allocated.

11.   A network device, comprising:
     means for making a classification for an incoming
packet;

15   means for determining whether a queue has already
been allocated for the classification; and
     means for allocating the queue when the queue has
not already been allocated for the classification.

20   12.   The network device of claim 11, wherein the queue is
associated with an ingress port of the network device.

13.   The network device of claim 11, wherein the queue is
a virtual output queue.

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14.   The network device of claim 11, further comprising:
     means for detecting when a queue is empty; and
     means for de-allocating the empty queue.

30   15.   The network device of claim 11, wherein the queue is
associated with an ingress port.

16. The network device of claim 11, wherein the classification is based on a packet source, a packet destination or a packet priority.

5   17. The network device of claim 11, wherein the classification comprises a Q number.

18. The network device of claim 11, wherein the determining means comprises means for addressing a memory
10 that indicates whether the classification has already been allocated a queue.

19. The network device of claim 14, further comprising means for updating a memory when a queue is de-allocated,
15 wherein the memory indicates whether the classification has already been allocated a queue.

20. The network device of claim 14, wherein the network device further comprises a free list that indicates
20 queues available for allocation.

21. The network device of claim 20, further comprising means for updating the free list when a queue is de-allocated.
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22. A computer program embodied in a machine-readable medium, the computer program configured to control a network device to perform steps comprising:
        making a classification for an incoming packet;
30   determining whether a queue has already been allocated for the classification; and
        allocating the queue when the queue has not already been allocated for the classification.

23. A network device, comprising:

a plurality of ports configured to receive incoming packets;

5 a classification engine for making classifications for incoming packets;

a memory that indicates whether a queue has already been allocated for a classification; and

a processor for allocating the queue when the memory

10 indicates that a queue has not already been allocated for the classification.

24. The network device of claim 23, wherein the memory is a content addressable memory.

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25. The network device of claim 23, wherein the memory is a random access memory.

26. A method of allocating queues in a network device,

20 the method comprising:

having no queues allocated at a first time;

receiving a first packet;

making a first classification for the first packet;

allocating a first queue for the first

25 classification;

receiving a second packet;

making a second classification for the second packet; and

determining whether the first classification is the

30 same as the second classification.

27. The method of claim 26, further comprising the step of allocating a second queue when the first

classification is different from the second
classification.

28.   The method of claim 26, further comprising the step
of assigning the second packet to the first queue when
the first classification is not different from the second
classification.

29.   A method of allocating queues in a network device,
the method comprising:
        determining a first number of packets that an
ingress port of the network device can receive; and
        allocating a second number of physical queues for
the ingress port, wherein the second number is less than
or equal to the first number.

30.   The method of claim 29, wherein the network device
operates according to the Fibre Channel protocol and
wherein the determining step is based on a number of
buffer-to-buffer credits granted by the ingress port.

31.   The method of claim 29, further comprising:
        identifying a category for each packet arriving at
the ingress port;
        correlating the category to an existing physical
queue; and
        storing packet information in the physical queue.

32.   The method of claim 29, further comprising:
        identifying a category for each packet arriving at
the ingress port; and
        assigning the category to a physical queue, wherein
the network device allocates a new physical queue only

when there is no existing physical queue for the
category.

33.   The network device of claim 31, wherein the packet
information comprises control information selected from
the list consisting of destination information, source
information, priority information, payload type
information and payload size information.

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